

# ENERGY STAR® Office, Bank/Financial Institution, and Courthouse Energy Performance Scale Development

Development Timeline:

October 2007 – Model Revision

June 2010 – Model Amended

All Documents Available at: G:\CPPD\C&I Branch\C&I Tools Team\ENERGY STAR Scale - Reference\Office

Primary Data Source – Commercial Buildings Energy Consumption Survey (CBECS) 2003

## Table of Contents

1. **Partner Presentation on Updates to Office Energy Performance Scale (November 8, 2006 – Alexandra Sullivan)**

This presentation communicates to industry stakeholders the planned revisions to the ENERGY STAR energy performance scale for offices. After briefly explaining what an energy performance scale is, the need for updates is explained (more informative/recent survey data, analysis of different operating characteristics, examination of alternative statistical methods for modeling, etc). Possible changes to building scores resulting from the updates and analysis of these changes are also discussed. The presentation concludes by requesting feedback from interested parties.

2. **Model Replication Document for ICF (May 2007 – Alexandra Sullivan)**

This document provides all information necessary to replicate the model for the Office, Bank, and Courthouse energy performance scale; This includes descriptive statistics summarizing CBECS survey data, the filters applied, the final model and the lookup table. The goodness-of-fit of this model is also discussed by providing statistics such as the  $R^2$  value and various graphs of residuals. EPA and ICF used this document to replicate the model independently.

3. **Final Data & Lookup Table (May 2007 – Alexandra Sullivan)**

This excel file was used to create the final lookup table. The spreadsheet contains all of the CBECS data for the 498 offices, banks/financial institutions and courthouses required to create the energy performance scale. All requisite variables for scoring each building are available such as seating density, heating degree days, pc density and hours of operation. Also shown are the results of a weighted regression, including the coefficients for each variable. The predicted EUI and energy efficiency ratios for each building are then determined and used to create a table listing the score and percentile corresponding to each building.

4. **Technical Model Instructions for SRA (June 14, 2007 – Alexandra Sullivan)**

This is the official technical instruction provided to SRA to revise the original Office model for release in October 2007. The document includes complete information on attributes, the prediction equation, the lookup table, eligibility criteria and required score change reports. The instructions also reflect other changes scheduled for the same release date, such as changes to weather normalization procedures and source energy conversion factors, along with changes to the models for K-12 schools, data centers and garages.

5. **C&I Branch Memo for Portfolio Manager Release (September 2007 – Alexandra Sullivan)**

This internal memo was prepared for the C&I Branch to summarize the expected score changes due to updates to several energy performance scales in the October 2007 release, including revisions to the Office, Bank, and Courthouse model. In addition to the significant changes to the Office model, other updates include the introduction of revised source energy conversion factors and new weather adjustments for all building types. The impact of these changes on all buildings' scores was discussed.

**6. Internal Memo Summarizing EPA Technical and Commercial Teams' Sensitivity Analysis of Current Office Model & Recommendations to Amend Model in Next Update (Nov 23, 2009 – Sara Lisauskas)**

This memo assesses the sensitivity of Office and Retail models to extreme values for each of their operating characteristics. The analysis demonstrated a bias for offices that have large values for square foot and worker/PC density, resulting in higher scores. A similar bias in favor of buildings with extremely high operating characteristics was found within the existing Retail Model. This memo includes an analysis of maximum value limits applied to each characteristic. The final recommendation is given along with a timeline for development and release of an updated model.

**7. Technical Model Instructions for SRA (Dec 11, 2009 – Alexandra Sullivan)**

This is the technical direction provided to SRA to update the revised Office model for release in June 2010. The update included new limits on office indoor space and PC density. The updates to Portfolio Manager specified are result of the sensitivity analysis discussed in Item 6. It also covers similar limits for the Retail model.

**8. C&I Branch Memo for Portfolio Manager Release (June 2010 – Alexandra Sullivan)**

This internal memo was prepared for the C&I Branch to summarize the expected score changes due to updates to several energy performance scales in the June 2010 release, including revisions to the Office, Bank, and Courthouse model. Also included were changes for Retail and Data Center models along with the parking adjustment for all models. The impact of these changes on all buildings' scores was discussed.

**9. Supplemental Internal Memo for Commercial Team Summarizing a More Detailed Analysis of Amended Office & Data Center Models in Next Update to Portfolio Manager (June 2010 – Alexandra Sullivan)**

This memo addresses score changes expected for Offices and Data Centers as a result of Portfolio Manager Updates planned for June 2010. This is a supplemental document to an overall description of the June 2010 changes (see Item 8) and provides a more detailed analysis of changes for the commercial real estate sector. Two major changes are analyzed: the correction in the office model for large buildings and the introduction of a new data center performance scale.

**10. Publicly Available Technical Description for Office, Bank/Financial Institution, and Courthouse (June 2010 – EPA & ICF)**

This is the publicly available document describing the Technical Methodology for the Office, Bank/Financial Institution and Courthouse energy performance scale. It explains how the model used to rate offices was developed and how it can be systematically applied to all eligible offices, banks, and courthouses. This document walks readers through each aspect of development and provides the reference data, the characteristics/variables analyzed, the filters applied, the statistical regression results (i.e. the coefficients and predictive formula) and an example calculation.